FORM FOR CALCULATING THE MASS TRANSFER COEFFICIENT FOR A QUIESCENT SURFACE IMPOUNDMENT

FACILITY NAME for site specific biorate determination	
COMPOUND for site specific biorate determination	Methanol

Input values

Enter the following:

F - Impoundment fetch (m)	
D - Impoundment depth (m)	
U10 - Windspeed 10 m above liquid surface (m/s)	
Dw - Diffusivity of compound in water (cm2/s)	
Dether - Diffusivity of ether in water (cm2/s)	
μG - Viscosity of air, (g/cm-s)	
G - Density of air, (g/cm3)	
Da - Diffusivity of compound in air, (cm2/s)	
A - Area of impoundment, (m2)	
H - Henry's law constant, (atm-m3/g mol)	
R - Universal gas constant, (atm-m3/g mol. K)	
μL - Viscosity of water, (g/cm-s)	
L - Density of liquid, (g/cm3)	
T - Impoundment temperature, (C)	

Calculate the following:

Calculate F/D:

Calculate the liquid phase mass transfer coefficient, kL, using one of the following procedures, (m/s)

Where F/D < 14 and U10 > 3.25 m/s, use the following procedure from MacKay and Yeun:

Calculate the Schmidt number on the liquid side, ScL, as follows:
ScL = μL/ LDw

Calculate the friction velocity, U*, as follows, (m/s):
U* = 0.01 x U10(6.1 + 0.63 U10)^0.5

Where U* is > 0.3, calculate kL as follows:
kL = (1.0 x 10^-6) + (34.1 x 10^-4)U* x ScL^-0.5

Where U* is < 0.3, calculate kL as follows:
kL = (1.0 x 10^-6) + (144 x 10^-4)(U*)^2.2 x ScL^-0.5

For all other values of F/D and U10, calculate kL using the following procedure from 2Springer:

Where U10 is < 3.25 m/s, calculate kL as follows: